Water Treatment Plant

Preliminary Engineering Report

> City of Carlisle, Kentucky

GRW Project No. 2942

August 2001

TABLE OF CONTENTS

- I. INTRODUCTION
- II. PURPOSE
- III. BACKGROUND CONSIDERATIONS
- IV. POPULATION & WATER USAGE
 - A. POPULATION
 - B. WATER USAGE
 - Table IV-1: Population Projections
 - Table IV-2: Water Customer Demand & Production History
 - Table IV-3: 1999-2000 Treatment Plant Production
 - TABLE IV-4: FUTURE PURCHASED WATER CUSTOMERS
 - Table IV-5: Water Production Projections
- V. EXISTING FACILITIES
 - A. RAW WATER SUPPLY
 - B. RAW WATER PUMP STATION
 - C. RAW WATER TRANSMISSION MAIN
 - D. PRESETTLING RESERVOIR
 - E. LOW SERVICE PUMP STATION
 - F. CHEMICAL MIX BASIN
 - G. CHEMICAL FEEDS
 - 1. POTASSIUM PERMANGANATE
 - 2. ALUM
 - 3. LIME
 - 4. CHLORINE
 - 5. FLUORIDE
 - 6. CORROSION CONTROL
 - H. FLOCCULATION BASIN

TABLE OF CONTENTS (CONT'D)

- I. SEDIMENTATION BASIN
- J. FILTERS
- K. CLEARWELL
- L. HIGH SERVICE PUMP STATION
- M. Instrumentation, Controls & Telemetry
- N. MISCELLANEOUS
- O. HIGH SERVICE TRANSMISSION MAIN
- P. RESIDUALS HANDLING & DISPOSAL
- TABLE V-1: RAW WATER QUALITY
- TABLE V-2: CHEMICAL USAGE INVENTORY
- EXHIBIT V-1: PROJECT SITE MAP
- EXHIBIT V-2: EXISTING WTP SITE PLAN
- EXHIBIT V-3: EXISTING PROCESS FLOW SCHEMATIC

VI. DEVELOPMENT OF ALTERNATIVES

- A. ALTERNATIVE No. 1 CONVENTIONAL FLOCCULATION/SEDIMENTATION WITH NEW FLOCCULATION & SEDIMENTATION BASINS
- B. ALTERNATIVE No. 2 CONVENTIONAL FLOCCULATION/SEDIMENTATION WITH NEW CIRCULAR FLOCCULATOR-CLARIFIER BASINS
- C. ALTERNATIVE No. 2 BALLASTED FLOCCULATION WITH HIGH RATE SEDIMENTATION
- EXHIBIT VI-1: ALTERNATIVE No. 1 SITE PLAN
- EXHIBIT VI-2: ALTERNATIVE NO. 2 SITE PLAN
- EXHIBIT VI-3: ALTERNATIVE No. 3 SITE PLAN
- VII. ALTERNATIVE ANALYSIS
- VIII. RECOMMENDED IMPROVEMENTS
 - A. RAW WATER PUMP STATION
 - B. RAW WATER TRANSMISSION MAIN

TABLE OF CONTENTS (CONT'D)

- C. Presettling Reservoir
- D. Low Service Pump Station
- E. CHEMICAL MIX BASIN
- F. CHEMICAL FEEDS
 - 1. POTASSIUM PERMANGANATE
 - 2. ENHANCED COAGULATION
 - 3. Post pH Adjustment
 - 4. CARBON
 - 5. CHLORINE
 - 6. FLUORIDE
 - 7. CORROSION CONTROL
- G. FLOCCULATION/SEDIMENTATION BASIN
- H. FILTERS
- I. CLEARWELL
- J. HIGH SERVICE/BACKWASH PUMP STATION
- K. Instrumentation, Controls & Telemetry
- L. MISCELLANEOUS
- M. HIGH SERVICE TRANSMISSION MAIN
- N. RESIDUALS HANDLING & DISPOSAL
 - EXHIBIT VIII-1: PROPOSED PROCESS FLOW SCHEMATIC
- IX. PRELIMINARY ENGINEERING COST ESTIMATE
- X. CONCLUSIONS AND RECOMMENDATIONS

APPENDIX A - CONSTRUCTION COST OPINION

- Raw Water Pump Station
- WTP Expansion ALTERNATIVE No. 1
- WTP Expansion ALTERNATIVE No. 2
- WTP Expansion Alternative No. 3